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menclature, suffice in very many cases to determine which of the syntypes is to be made the lectotype.¹⁸

Supplementary Typical Material

Besides the type material proper there are the so-called supplementary types (plesiotypes) and typical specimens (topotypes, etc.) which have been treated in detail by Schuchert. These need not be considered here, as they are merely specimens judged, with more or less show of reason, to be like the type. Often, perhaps usually, they do not belong in the type collection at all.

To summarize briefly the different kinds of type material we have:

I. Type Material Proper

1. Primary types, specimens used by the author in describing a new species, including either (a) the true type (with its *clastotypes*) and *paratypes*, or (b) the *syntypes*.

2. Additional types, specimens taken from the type plant or from its offspring, including *merotypes*, *clonotypes* and *spermotypes*.

3. Substitute types, specimens selected as types when the type was not designated, including *lectotypes*.

4. Reproduced types, mechanical reproductions of types, including *phototypes*, *piesmotypes* and *plastotypes*.

II. Supplementary Typical Material

5. Supplementary types, specimens used as a basis for descriptions or figures of previously published species, *plesiotypes*.

6. Typical material, specimens (from the type locality if possible) considered to be like the type, *topotypes*, etc.

WALTER T. SWINGLE

MOSQUITOES POLLINATING ORCHIDS

EARLY in July, 1912, Miss Ada K. Dietz, who was doing research work in plant ecology at the University of Michigan Biological Station at Douglas Lake, told me that she had seen in Rees's Bog a mosquito bearing on its

¹⁸ Arthur, J. C., et al., 1907, "American Code of Botanical Nomenclature," in *Bull. Torrey Bot. Club*, 34: 172-174, No. 4, April, published June 11.

head two small yellow masses that looked like pollen. I went to the bog and found many mosquitoes there. In a few minutes I had caught a half dozen or more, all of them females, bearing the yellow masses. On closer examination these proved to be pollinia of the orchid, *Habenaria obtusata* (Pursh.) which was at that time abundant in the bog and in full bloom. Most of the mosquitoes carried one pollinium, some had two or three, and one had four pollinia attached to its eyes.

This orchid is small, green and inconspicuous, but very similar in the structure of its flower to *Orchis mascula*, described by Darwin in his book on the "Fertilization of Orchids," and by Müller in "The Fertilization of Flowers." Also, the complex process of pollination as described in the last named book (p. 535) for *O. mascula* might apply almost unchanged for *H. obtusata* with mosquitoes instead of bees for the pollen-bearers.

I gathered a number of the plants and a few mosquitoes that were free from pollinia and put them together in a glass aquarium jar. In a few days the mosquitoes had removed most of the pollinia from the flowers and now bore them on their eyes exactly as had those caught outside.

I did not learn the name of the mosquito concerned. It was probably not *Culex pipiens*, which is mentioned by Müller as a visitor to the flowers of *Rhamnus Frangula*. So far as I know, this is the only case reported in which mosquitoes seem to be of primary importance as agents of pollination.

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SCIENTIFIC BOOKS

The New Realism: Cooperative Studies in Philosophy. By E. B. HOLT, W. T. MARVIN, W. P. MONTAGUE, R. B. PERRY, W. B. PITKIN and E. G. SPAULDING. New York, The Macmillan Company. 1912.

The World We Live In. By GEORGE STUART FULLERTON. New York, The Macmillan Company. 1912.

The first of these contributions to philos-

ophy should have a somewhat exceptional interest for men of science. For it makes use of data drawn from the special sciences more than is the wont of philosophical books; it represents an attempt to introduce something more closely resembling the scientific method and temper into philosophical inquiry; and it is chiefly devoted to the establishment of a conclusion which, if accepted, would apparently necessitate the relinquishment of certain modes of thought and speech frequently used in the interpretation of the methods and results of scientific observation. In the spirit and procedure of the authors there is much that is both rare and laudable. Real, organized cooperation in philosophizing—the provisional segregation of definite questions, and an attempt to reach a collective answer to them by methods which have borne the test of open discussion at close quarters and of repetition by other inquirers—this is still a sadly unaccustomed practise among philosophers; there are even those who deem it impossible and of dubious desirability. Whatever else they have done, the six authors of “The New Realism” have in this matter set the philosophical world an example which it is to be hoped will be not only praised but imitated. Nor is it only in their cooperation that they have carried over the temper of science into the business of the philosopher. The book for the most part is singularly free from those *arrière-pensées* which often vitiate, even though they enrich and make more humanly interesting, philosophic reflection. There is almost no trace of the desire to edify, no great solicitude as to the immediate bearing of their results upon “life,” no tendency to confuse philosophy with either poetry or preaching. The writers seem desirous merely of reaching a verifiable conclusion upon a specific issue. With complete intellectual detachment they can not, indeed, quite be credited; they have, after all, a *parti pris*, and at least one of the six writes much in the style and spirit of the special pleader. But since they have a common cause to sustain, the openness with which they acknowledge its initial difficulties and disclose their inability

to agree upon a common solution of those difficulties, is the more admirable. One’s admiration would, indeed, have been still greater if this had led to an actual suspension of judgment upon the main issue, as the final result of the cooperative effort—which, as will appear, is the result towards which, at most, the course of the argument would seem to point. But this, perhaps, is more than it would be reasonable to expect. Even as it is the book is an almost unique example of a genuine and persistent attempt at close thinking *together*—at a literally “dialectic” process—on the part of a considerable number of philosophers, of whom none stands in the relation of master to the others.

The point in the “new realism” which constitutes both its novelty and its chief significance for natural science is, not its realism, but its doctrine about consciousness. For that doctrine, if accepted, entails the abandonment of certain conceptions still extensively used by science as well as by common sense. It has been, moreover, the generating principle of the whole theory, from which all of its principal conclusions and most of its characteristic difficulties have arisen. It is the more important to recall this fact because, while this theory of consciousness clearly underlies much of the reasoning in the volume, it is not altogether definitely and connectedly stated here (though it has been so stated in previous writings of some of the group), and it seems at times to be forgotten altogether.

The doctrine in question is this: that what is commonly called “consciousness” is simply a particular mode of relation; and that it is an “external” relation, *i. e.*, one which does not constitute or in any way alter the terms which at any time happen to enter into that relation. From this doctrine follow directly the two essential articles in the new realism’s account of the nature of the transaction called sense-perception—its affirmation, at once, of the “independence” and of the “immanence” of the object perceived. Given the conception of consciousness as merely an otiose relation among items totally unaffected thereby, and

the object necessarily must be independent; for such a relation is not a thing upon which anything *could* depend. No less obviously must the object be immanent; *i. e.*, must at the time of perception be "numerically" and in all other respects identical with the percept. For there is nothing in an external relation which could produce duplicates or "images" of the terms related. Thus the root-doctrine of this new philosophy is "the relational theory of consciousness," which branches out into the two derivative doctrines of realism and epistemological monism (*i. e.*, the doctrine that object and idea or percept are one identical entity). Not only does it produce these secondary conclusions; it apparently provides their chief support. I, at least, am unable to find in the volume much *positive* argument (as distinct from proofs of the inconclusiveness of certain arguments of idealism and dualism) for the object's independence and immanence, except deductions from the relational theory of consciousness. Upon the validity of this theory, then, the constructive part of the new realism depends. I shall accordingly limit the present examination of this collection of reasonings to two questions: (1) What positive reasons are offered for the opinion that consciousness is merely an external relation? (2) How do the new realists meet the usual arguments—not of idealism, but of common sense—for the view that consciousness can not possibly in all cases be an external relation, that, in other words, *some* content of consciousness must be regarded as existing only in and by means of consciousness?

1. With regard to the first point, one must first of all complain that the relational theory of consciousness is left, in two important respects, in great obscurity. It still remains difficult to determine just *what kind* of relation *to* what, the consciousness-relation is supposed to be. So far as the authors approach definiteness upon this, they also seem to diverge from one another. But I do not here wish to dwell upon this consideration. More serious is the uncertainty in which the reader is left with respect to another question. Is

consciousness held to be *wholly and in all cases* non-constitutive of the content that is in consciousness? Does the new realism mean to reject the notion of "purely subjective existence" *in toto*, and to maintain that all experiences are equally independent and objective, that only things, and not thoughts, exist at all? For Perry, the answer appears to be negative; this view, he observes, "is not part of realism." "Values," "interests," "higher complexes, such as history, society, life or reflective thought," all these *are* "dependent on consciousness." Independence, then, is not universally predicated of things experienced; all that is maintained is that "*in certain notable cases, at least*, things are none the less independent for being perceived." But this is an immense and fatal qualification of the relational theory. For if consciousness is *capable* of having content that depends upon it for existence, that is purely its own, one obviously can not argue from a general incapacity of consciousness to constitute its own content to the conclusion that the objects of perception are independent, etc. The nerve of the main positive argument for both realism and epistemological monism is thus cut. If consciousness is in some cases an external and in some cases a constitutive "relation," it becomes necessary to adduce specific empirical evidence to show that in each and every case of perception it is of the former sort. And no such evidence is offered. Strictly empirical evidence, indeed, it is manifestly impossible to offer; since things are always experienced in the consciousness-relation, experience, at least, can not testify to their independence of and externality to that relation. If, then, we take the external-relation theory in Perry's sense—as meaning merely that consciousness *may be* an external relation—we must admit the theory to be true. There are, doubtless, external relations; and it is conceivable that "being in consciousness" may sometimes be one of them. But from this "may-be" no proof of the neo-realistic theory of perception can be drawn; yet no other positive proof is given.

Others of the group, therefore, avoid

Perry's damaging concession. Pitkin, for example, declares that "the realist can not count his case won" until he has shown "the complete independence of all things thought of." He feels obliged, therefore, to hold that even hallucinatory objects, and errors of all sorts, are "no less independent of cognition than true propositions are." That secondary qualities, illusory presentations, and the like, can all be, without contradiction, conceived as objective and independent, Montague, Holt and Pitkin alike are concerned to show; and the only imaginable reason for their undertaking to justify this paradox is an acceptance of the view that consciousness is *in no case* constitutive of any perceived content, that it is always and absolutely a relation which does not create its terms nor modify their other relations.

But for this more rigorous construction of the relational theory, what evidence is offered? It, if established, would prove neo-realism's case, as I have admitted; but by what argument is this all-important premise itself to be established? Of general and positive arguments for it there are, so far as I can see, none in the book. Direct empirical evidence is, once more, unattainable, in the nature of the case, and is not attempted. What we are given is merely a series of attempts to show that the theory is not absurd, that the general and unqualified assertion that no perceived datum ever does or can depend upon its relation to a perceiver for its existence or any of its attributes or its other relations, is not the extravagance which it at first appears to be. Even if these attempts be regarded as successful, they could not, by a rigorous logician, be regarded as establishing the conclusion desired. There are many propositions which are not absurd which are also not true. The battle for the relational view of consciousness can hardly be won by purely defensive tactics. But are even those tactics successful? To this question we must now turn.

2. Science, I have said, as well as popular thought, is still, as a rule, accustomed to think of some of the content of experience as existing "merely subjectively." The whole

distinction between appearance and reality—in the ordinary, empirical sense—which science has found so indispensable has usually taken the form of the supposition that certain data of perception,—*e. g.*, the secondary qualities of matter, illusions, dreams, hallucinations—can be explained away as having their being only in "minds" and by virtue of minds, as *being* only in so far as, and only in the sense that, somebody is conscious of them. This, then, is the way of thinking and of speaking which the new realism (in so far as it treats its relational theory of consciousness as a universal proposition) invites us to give up. It therefore proposes a radical revision of widely current preconceptions. The important question to raise concerning it, then, is this: Can we, while maintaining realism, *completely* dispense with the idea of "subjective appearance," of "mental representations" of objects, can we hold without self-contradiction that what things seem they also are, and that the entity present "in consciousness" whenever we perceive or think of an object is just the original, *simon-pure* object itself, untransformed, unduplicated and untransposed?

That their doctrine stands or falls with the answer to this question, the authors very frankly acknowledge. "The crucial problem," says Pitkin, "for the new realism is the problem of error (in all forms). And the acutest critics" of the doctrine "urge that its fatal flaw is the acceptance of the full 'objective' nature of illusions and errors and its simultaneous refusal to put illusory objects, with all their colors, shapes and behaviors, identically in the very space and time in which they immediately belong. If the charge is true it is deadly." To meeting this type of objection the papers of Montague, Holt and Pitkin are chiefly devoted.

Unfortunately space is lacking here for an adequate analysis of these highly ingenious and rather involved pieces of argumentation; that examination must be attempted elsewhere. For the present it must suffice to observe that these three writers are unable to agree upon any one "solution of the problem of error" in terms which shall be consistent with

their general doctrine. Each repudiates the solutions of the others; each, therefore, from the point of view of the others, has no logical right to be a new realist, since he fails (in their eyes) to meet satisfactorily an objection which admittedly must be met before the new realism can be regarded as tenable. So long as these spokesmen of a common cause, after prolonged conference and discussion *inter se*, are unable to convince one another, no one of them will feel it surprising that he fails to convince his readers. Nor is this the worst of the situation. In an appendix definite refutations are offered of all three solutions; Montague refutes Holt and Pitkin, and Pitkin refutes Montague. This does infinite credit to their candor and philosophical good faith; but it leaves their doctrine in a parlous state. For both appear to me to be perfectly good refutations; so that at the end of the volume the formal outcome of the triple effort to solve the problem of error and meet the opponent's argument from hallucinations is literally *nil*. $3-1-1-1=0$.

Thus far, then, I do not think it can be said that these vigorous innovators have demonstrated that consciousness does not exist save as an irrelevant relation between objects always and absolutely uncolored by its presence; or that the convenient supposition that some things in consciousness exist solely therein, as "subjective appearances," must be abandoned. But failing a proof of this, the new realism, as a whole, is lacking in logical substructure.

In the interest of a discussion of this main issue, I have been obliged to omit mention hitherto of two carefully reasoned papers which are less closely related to that issue: that of Marvin on "The Emancipation of Metaphysics from Epistemology" and that of Spaulding, "A Defense of Analysis." These both reward the reading irrespective of one's interest, or lack of it, in the new realism. Spaulding's paper contains an effective analysis of some of the confusions of Bergson and other anti-intellectualists.

Professor Fullerton's book also is a defense of "the new realism," but apparently not of

the same new realism. We shall soon be obliged to distinguish the various claimants of the name by numerals. Just how Fullerton's view is logically related to that of the authors already discussed, it is a matter of some difficulty to determine. He sometimes seems plainly to reject the relational conception of consciousness and the resultant epistemological monism. "The world," we are told, "is phenomenon; it is in a sense a function of the creature perceiving the world. Each gazes upon his own world." There is "a whole series of phenomenal worlds differing more or less from one another. Only one of these is ours and is known by us directly" (pp. 106-107). There are apparently some things which "should be regarded as existing only in the mind" (p. 129), which are "internal and subjective" (p. 131). Yet we are also told that we are "as directly conscious of external things as we are of anything whatever," and that "we may with a clear conscience accept as external the things we actually perceive, with just the qualities and relations which we perceive them to have" (p. 149). Thus even the secondary qualities are "external" and in no sense subjective (Ch. X.). We do not perceive images of objects, but the objects themselves. Even so qualified a form of the representational theory of perception as Strong's "substitutionalism" is rejected (p. 158). Thus, so far as normal perception is concerned, Fullerton seems first to deny and then to adopt the theory of the immediacy or "immanence" of the real object in perception. The final criterion, however, of any writer's attitude towards the view that consciousness is an external relation lies in his explanation of the facts of error and hallucination. Is the hallucinatory object a function of the perceptual process or is it, too, "external" and independent thereof? Does the long-extinct star "really exist" at the moment when I belatedly perceive it? If not, does not the star actually perceived subsist at the moment in dependence upon the consciousness of that moment? Unfortunately, Fullerton, while he raises these questions, does not meet them in a way which unequivocally de-

finer his attitude to the relational theory. He observes (pp. 156-163) that our errors are largely mere omissions and not creations; that even illusions "deceive no well-informed person"; and that "were men sufficiently well-informed, and were such experiences sufficiently common, there would in no case be the shadow of an illusion," which seems to mean only that if there were no illusions there would be no illusions. The fact remains that illusions, hallucinations and dreams occur; and the question is whether (as some neo-realists hold) the content presented in these can be said to exist in real, objective space, at the time of its presence in consciousness, and whether there is any justification for, or meaning in, calling it "independent" of consciousness. To this question, with which the other new realists so laboriously deal, Fullerton, so far as I can see, gives no entirely plain answer; and it is for this reason that the relation of his realism to theirs remains, at the most significant point of all, obscure. I take it, however, that he does *not* view consciousness as an absolutely functionless relation, and that he would reject the paradox of the objectivity of the illusory.

Assuming this to be his meaning, Fullerton must be understood to regard some content of perception as purely mental, or subjective, and some as wholly objective and independent. The further question remains: Where, and by what criterion, shall we draw the line between the two? Patient and subtle as are Fullerton's reasonings upon this point, I do not find them altogether clear or convincing. His desire, evidently, is to make the realm of the subjective a very little one; hence his exclusion from it even of the secondary qualities, and his apparent reduction of it to the hallucinatory and imaginary merely. But his reasons for drawing the line where he does appear to me blurred through a failure to give and adhere to a single, clear definition of "external" and "objective." In a general way one gathers that (pp. 111-115) things and qualities are external, in the proper sense, when they do not involve a "relation to our sense-organs," when I "can account for them

without referring to the relation of my body to them." But this throws little light upon the subject. How am I to know when data which are obviously mediated through my sense-organs involve no relation thereto? When (as in the case of color) specific variations in my sense-organs are uniformly accompanied by specific variations in the qualities which appear in consciousness, are not the latter, in accordance with the definition given, "internal" or mental? But in that case, what becomes of the proof of the externality of color-qualities? Does Fullerton, then, mean that anything is external which without contradiction can be *conceived* as existing without involving the idea of my body? If this is what is meant, one must still object that there are familiar arguments which seem to show that most of the perceived qualities which one object presents to different percipients *are* reciprocally contradictory, so long as the qualities are regarded as inhering independently in the object by itself, and not as functions of its diverse relations to those percipients. These points not being satisfactorily dealt with, Fullerton's realistic construction fails of complete definiteness of outline and consequently of cogency.

A noteworthy part of the book is the interpretation of Kant as the "first great modern realist" (Chaps. V.-VII.); this view is not new, but it has never, perhaps, been so forcibly presented. The most brilliant chapters in the volume are the critical ones. The passages on absolute idealism and on pragmatism are delightfully witty, yet eminently searching, examples of philosophic satire. The latter, I think, is less than just to some aspects of pragmatism; but the former (Chaps. XIII.-XV.) is a masterpiece in its kind.

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Handbuch der Entomologie. Herausgegeben von Professor Dr. CHR. SCHRÖDER. Jena, Gustav Fischer. 1913.

For the past twenty years Kolbe's "Einführung" has been the best known German text-book on entomology. Now Dr. Schröder